

## **Better policy analysis with better data. Constructing a Social Accounting Matrix from the European System of National Accounts\*.**

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### **Abstract**

This paper will discuss the importance of the SAM (Social Accounting Matrix) as a consistent and flexible database for economic modelling to be used for the purpose of ensuring a better policy analysis.

It will be shown how the SAM represents the circular flow of income and how it can support disaggregated economy-wide modelling.

It will further be demonstrated how a SAM can be constructed from the SNA 93 (1993 version of the United Nations System of National Accounts) in an ESA 95 framework (European System of National and Regional Accounts in the European Community of 1995), and, using an example for Portugal, how it can be implemented in the European Union.

***Key words:*** Social Accounting Matrix; National Accounts; Economic Modelling

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## 1. Introduction

The Social Accounting Matrix (SAM) is a square matrix and can be considered as an organized framework that presents a set of accounts between and within which the flows of funds (or the nominal flows) represent the circular flows of income in a market economy.

By convention, the entries made in rows represent resources, incomes, receipts or changes in assets, whilst the entries made in columns represent uses, outlays, expenditures or changes in liabilities and net worth, each transaction being recorded only once in a cell of its own. These figures will include both production and institutional accounts, which are further subdivided into yet other accounts, defined in accordance with the goal of the study and the available information.

The National Accounting Matrix (NAM)<sup>1</sup> is also a square matrix that can be considered as an organized framework of the national accounts, whose similarity with the SAM makes it possible to construct one matrix from the other, as shown in this paper. Consideration will be given here to the 1993 version of the United Nations System of National Accounts - SNA 93, prepared by the Inter-Secretariat Working Group and published by the United Nations Statistical Office (ISWG, 1993), and its application to the European Union through the European System of National and Regional Accounts in the European Community of 1995 - ESA 95 (Eurostat, 1996).

Although the NAM is sometimes referred to as a SAM, the NAM presented here will be the one that is presented in chapter XX of SNA93, (ISWG, 1993) and Prgs.8.133 – 8.155 of ESA 95, (Eurostat, 1996) and the SAM will be the one developed from the work of Graham Pyatt and his associates (Pyatt, 1988 and 1991; Pyatt and Roe, 1977; Pyatt and Round, 1985), inspired upon Sir Richard Stone's works, pioneered by his 1954 article "Input-Output and the Social Accounts".

Each SAM can be expressed in two versions: numerical and algebraic. In the numerical version, each cell assumes a specific number value, the sums of the rows being equal to the sums of the columns. In the algebraic version, each cell is represented by an algebraic expression that, together with those of all the other cells, represents a SAM-based model, the calibration of which depends upon the replication of the numerical version.

Therefore, the numerical version needs to be a good one in order to be able to support good models, the Computable General Equilibrium (CGE) models being considered particularly appropriate for operating with a SAM framework (Abbink et al., 1995).

On the one hand, Section 2 of this paper will show the similarity between the SAM and the NAM, explaining how to pass from one to the other, while, on the other hand, using an example for Portugal, it will show how the SAM could be implemented in the European Union.

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<sup>1</sup> Expression adopted from Keuning (1991).

Section 3 discusses the importance of the SAM (Social Accounting Matrix) as a consistent and flexible database for economic modelling to be used for the purpose of ensuring a better policy analysis.

Section 4 ends the paper with some concluding remarks.

## 2. From a National Accounting Matrix (NAM) to a Social Accounting Matrix (SAM)

As will be shown, there exists a close correspondence between both the accounts and the cells of the NAM and the SAM.

Let us consider each transaction (“T”) as a nominal flow in the economy, with which are associated two indexes, characterizing its location in a matrical framework and representative of the row and column accounts in which it is recorded: an income (the first) and the corresponding expenditure (the second) – in accordance with the convention described in Section 1.

**Table 1.** The accounts and the “T” indexes of the NAM and the SAM

NAM		SAM		Description (SNA93; ESA95)
account	index	account	index	
goods and services	0	products	p	shows how the available products are used
production	I	activities	<i>a</i>	describes the transactions that constitute the appropriately named production process
primary distribution of income	II.1	factors of production	f	shows how the incomes that accrue as a result of involvement in processes of production or the ownership of assets that may be needed for production purposes are distributed among institutions and activities
secondary distribution of income, redistribution of income in kind account; use of income	II.2&3; II.4	current account of the (domestic) institutions	dic	shows, on the one hand, how the balance of primary income (national income) is transformed into disposable income through the receipt and payment of current transfers, and, on the other hand, how gross disposable income is distributed between final consumption and saving
capital	III.1	capital account of the (domestic) institutions	dik	records transactions linked to acquisitions of non-financial assets and capital transfers involving the redistribution of wealth
financial	III.2	financial account of the (domestic) institutions	dif	records transactions in financial assets and liabilities between institutional units, and between these and the rest of the world
rest of the world	V	rest of the world	rw	records transactions between resident and non-resident units

Although, mainly in the case of the SAM, the accounts do not follow any specific order and depend on whoever is working with them, the order that is used here is the same as the one used by those who conceived this methodology and are referred to in the “sources” of Tables 2 and 3.

**Table 2.** The nominal transactions in the National Accounting Matrix

	0	I	II.1	II.2&3	II.4	III.1	III.2	V
0	$T_{00}$	$T_{0I}$	0	0	$T_{0II.4}$	$T_{0III.1}$	0	$T_{0V}$
I	$T_{I0}$	0	0	0	0	0	0	0
II.1	0	$T_{II.1I}$	$T_{II.1II.1}$	0	0	0	0	$T_{II.1V}$
II.2&3	0	0	$T_{II.2\&3II.1}$	$T_{II.2\&3II.2\&3}$	0	0	0	$T_{II.2\&3V}$
II.4	0	0	0	$T_{II.4II.2\&3}$	$T_{II.4II.4}$	0	0	0
III.1	0	0	0	0	$T_{III.1II.4}$	$T_{III.1III.1}$	0	$T_{III.1V}$
III.2	0	0	0	0	0	$T_{III.2III.1}$	$T_{III.2III.2}$	$T_{III.2V}$
V	$T_{V0}$	0	$T_{VII.1}$	$T_{VII.2\&3}$	0	$T_{VIII.1}$	$T_{VIII.2}$	

Sources: SNA93, chapter XX (ISWG, 1993); ESA95, Prg.8.133 – 8.155 (Eurostat, 1996); Round (2003).

**Table 3:** The nominal transactions in the Social Accounting Matrix

	f	a	p	dic	dik	dif	Rw
f	0	$T_{fa}$	0	0	0	0	$T_{frw}$
a	0	0	$T_{ap}$	0	0	0	0
p	0	$T_{pa}$	$T_{pp}$	$T_{pdic}$	$T_{pdik}$	0	$T_{prw}$
dic	$T_{dicf}$	$T_{dica}$	$T_{dicip}$	$T_{dicdic}$	0	0	$T_{dicrw}$
dik	0	0	0	$T_{dikdic}$	$T_{dikdik}$	$T_{dikdif}$	$T_{dikrw}$
dif	0	0	0	0	0	$T_{difdif}$	$T_{difrw}$
rw	$T_{rwf}$	$T_{rwa}$	$T_{rwp}$	$T_{rwdic}$	$T_{rwdik}$	$T_{rwdif}$	

Sources: Pyatt, 1988 and 1991; Pyatt and Roe, 1977; Pyatt and Round, 1985.

Note: The first three accounts (f = factors of production, a = activities and p = products) are the production accounts of the economy and the following three (dic = current; dik = capital; dif = financial) are the accounts of the (domestic) institutions. The last one (rw = rest of the world) represents the “outside” of the (domestic) economy.

Not considering the consumption of fixed capital, in other words working in gross terms<sup>2</sup> and considering sets or blocks of transactions/submatrices, which are sometimes balances, with the same characteristics<sup>3</sup>, it is possible to establish the following connections.

1. Compensation of factors of production.

- a. SAM transactions:  $T_{fab}$  or gross added value (at factor cost);  $T_{dcf}$  or gross national income (at factor cost);  $T_{f_{rw}}$  or compensation of factors from the rest of the world;  $T_{rw_f}$  or compensation of factors to the rest of the world.
- b. NAM transactions:  $T_{II1}$ , or gross added value (at market prices);  $T_{II1II1}$ , or property income received/paid by domestic institutions from/to domestic institutions;  $T_{II2\&3II1}$ , or gross national income (at market prices);  $T_{II1V}$  or primary income from the rest of the world;  $T_{VII1}$ , or primary income to the rest of the world.
- c. National Accounts transactions: compensation of employees (code D1 – SNA 93, Prg. 7.21-7.47; ESA 95, Prg. 4.02-4.13); property income (code D4 - SNA 93, Prg. 7.87-7.133; ESA 95, Prg. 4.41-4.76); gross added value/gross domestic product (at market prices, code B1g); gross national income (at market prices, code B5g).
- d. Difference between SAM and NAM: net indirect taxes, which are considered separately by the first matrix (see the block).

2. Production.

- a. SAM transaction:  $T_{ap}$  or output of goods and services (at base prices).
- b. NAM transaction:  $T_{I0}$  or output of goods and services (at market prices).
- c. National Accounts transaction: output of goods and services (code P1 - SNA 93, Prg. 6.38-6.51; ESA 95, Prg. 3.14-3.68).
- d. Difference between SAM and NAM: net taxes on products, which are a part of the net indirect taxes and are considered separately by the first matrix (see the block).

3. Intermediate consumption.

- a. SAM transaction:  $T_{pas}$  or intermediate consumption.
- b. NAM transaction:  $T_{0i}$  or intermediate consumption.
- c. National Accounts transaction: intermediate consumption (code P2 - SNA 93, Prg. 6.147-6.178; ESA 95, Prg. 3.69-3.73).

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<sup>2</sup> The consideration of this item was postponed until the next stage of our research, together with the study of the possibility of calculating the capital stock of the economy and its changes.

<sup>3</sup> Santos (2006) provides a detailed explanation of these.

4. Gross capital formation.
  - a. SAM transaction:  $T_{pdk}$ , or gross capital formation.
  - b. NAM transaction:  $T_{0III}$ , or gross capital formation.
  - c. National Accounts transaction: gross capital formation (code P5 - SNA 93, Prg. 10.32-10.130; ESA 95, Prg. 3.100-3.127).
  
5. Net indirect taxes or net taxes on production and imports, which include net taxes on production and net taxes on products.
  - a. SAM transactions:  $T_{dc\ ab}$ , or net taxes on production paid to domestic institutions (general government);  $T_{rw\ ab}$ , or net taxes on production paid to the rest of the world;  $T_{dc\ p}$ , or net taxes on products paid to domestic institutions (general government); part of  $T_{rw\ p}$ , or net taxes on products paid to the rest of the world.
  - b. NAM transaction: part of  $T_{I0}$ , or output of goods and services; part of  $T_{III\ I}$ , or gross added value; part of  $T_{II2\&3\ II1}$ , or gross national income. All these amounts are stated at market prices and therefore include net indirect taxes.
  - c. National Accounts transactions: (other) taxes on production (code D29 - SNA 93, Prg. 7.70; ESA 95, Prg. 4.22-4.24), net of (other) subsidies on production (code D39 - SNA 93, Prg. 7.79; ESA 95, Prg. 4.36-4.40); taxes on products (code D21 - SNA 93, Prg. 7.62-7.69; ESA 95, Prg. 4.16-4.21), net of subsidies on products (code D31 - SNA 93, Prg. 7.73-7.78; ESA 95, Prg. 4.33-4.35).
  
6. Final consumption.
  - a. SAM transaction:  $T_{p\ dc}$ , or final consumption (in the economy); part of  $T_{rw\ dc}$ , or direct purchases abroad by residents.
  - b. NAM transaction:  $T_{0II4}$ , or final consumption (total); part of  $T_{V0}$ , or direct purchases abroad by residents.
  - c. National Accounts transaction: final consumption (code P3 - SNA 93, Prg. 9.45-9.71; ESA 95, Prg. 3.75-3.80).
  - d. Difference between SAM and NAM: direct purchases abroad by residents.
  
7. External Trade.
  - a. SAM transaction: part of  $T_{rw\ p}$ , or imports (not considering direct purchases abroad by residents);  $T_{prw}$ , or exports.
  - b. NAM transaction: part of  $T_{V0}$ , or imports of goods and services;  $T_{0V}$ , or exports of goods and services.

- c. National Accounts transaction: imports and exports (codes P7 and P6 - ESA 95, Prg. 3.128-3.146<sup>4</sup>)
  - d. Difference between SAM and NAM: direct purchases abroad by residents.
8. Trade and transport margins.
- a. SAM transaction:  $T_{pp}$ , or trade and transport margins.
  - b. NAM transaction:  $T_{00}$ , or trade and transport margins.
  - c. National Accounts transaction: trade and transport margins (SNA 93, Prg. 6.110-6.114, 15.40-15.44; ESA 95, Prg. 3.60, 9.38-9.41).
9. Current transfers.
- a. SAM transactions:  $T_{dc\ dc}$ , or current transfers within domestic institutions (including the adjustment made for the change in the net equity of households in the pension fund reserve); part of  $T_{rw\ dc}$ , or current transfers to the rest of the world;  $T_{dc\ rw}$ , or current transfers from the rest of the world.
  - b. NAM transactions:  $T_{II2\&3\ II2\&3}$ , or current transfers within domestic institutions;  $T_{II4\ II4}$ , or the adjustment made for the change in the net equity of households in the pension fund reserve;  $T_{vII2\&3}$ , or current transfers to the rest of the world;  $T_{II2\&3\ v}$ , or current transfers from the rest of the world.
  - c. National Accounts transactions: current taxes on income, wealth, etc. (code D5 - SNA 93, Prg. 8.43-8.54; ESA 95, Prg. 4.77-4.82); social benefits and contributions (code D6 - SNA 93, Prg. 8.67-8.83 and 8.99-8.106; ESA 95, Prg. 4.83-4.108); other current transfers (code D7 - SNA 93, Prg. 8.84-8.98; ESA 95, Prg. 4.109-4.140); adjustment made for the change in the net equity of households in pension fund reserves (code D8 - SNA 93, Prg. 9.14-9.20; ESA 95, Prg. 4.141-4.144).
  - d. Difference between SAM and NAM: Because the amount of the social transfers in kind (transaction code D63) represents a final consumption expenditure (nominal flow) of the government and the non-profit institutions serving households, in the SAM it is not considered under this item but in the final consumption block.
10. Gross saving.
- a. SAM transaction:  $T_{dk\ dk}$ , or gross saving.
  - b. NAM transaction:  $T_{III1\ II4}$ , or gross saving.

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<sup>4</sup> The SNA 93 (ISWG, 1993) does not deal directly with these transactions, which are dealt with in all the other transactions with the rest of the world in its Section XIV – the rest of the world account (external transactions account).

- c. National Accounts transaction: gross saving (code B8g, saving - SNA 93, Prg. 9.17-9.20; ESA 95, Prg. 8.96).

#### 11. Capital transfers.

- a. SAM transactions:  $T_{dk\ dk}$  or capital transfers within domestic institutions;  $T_{rw\ dk}$  or capital transfers to the rest of the world;  $T_{dk\ rw}$  or capital transfers from the rest of the world.
- b. NAM transactions:  $T_{III\ I\ III}$ , or capital transfers within domestic institutions;  $T_{V\ III}$ , or capital transfers to the rest of the world;  $T_{III\ V}$ , or capital transfers from the rest of the world.
- c. National Accounts transactions: capital transfers (code D9 - SNA 93, Prg. 10.131-10.141; ESA 95, Prg. 4.146-4.167); acquisitions less disposals of non-financial non-produced assets (code K2 - SNA 93, Prg. 10.120-10.130; ESA 95, Prg. 6.06-6.13).

#### 12. . Net borrowing/lending.

- a. SAM transaction:  $T_{dk\ dif}$  or (-) net borrowing/lending.
- b. NAM transaction:  $T_{III\ 2\ III}$ , or net borrowing/lending.
- c. National Accounts transaction: net borrowing/lending (code B9 - ESA 95, Prg. 8.98).
- d. Difference between SAM and NAM: those amounts that fall short of (+) or exceed (-) the investment funds used to cover aggregate investment are registered in the capital and financial accounts, since they are financial transactions from (in the case of net borrowing) or to (in the case of net lending) the rest of the world. That is why, in the SAM, the mathematical sign is exchanged.

#### 13. Financial transactions.

- a. SAM transactions:  $T_{dif\ dif}$  or financial transactions within domestic institutions;  $T_{rw\ dif}$  or financial transactions to the rest of the world;  $T_{dif\ rw}$  or financial transactions from the rest of the world.
- b. NAM transactions:  $T_{III\ 2\ III}$ , or financial transactions within domestic institutions;  $T_{V\ III}$ , or financial transactions to the rest of the world;  $T_{III\ 2\ V}$ , or financial transactions from the rest of the world.
- c. National Accounts transactions: financial transactions (codes F1 to F7 - SNA 93, Prg. 11.1-11.111; ESA 95, Prg. 5.01-5.151).

Therefore, generally speaking, if it were not for indirect taxation and direct purchases abroad by residents, the association of the SAM and NAM accounts would be perfect – with the SAM being calculated from the NAM. The latter could also be calculated from the former, which may not be true if some disaggregation is undertaken.



Macroeconomic aggregates and indicators can be extracted from the cells of the matrices, notably, using the SAM description:

- Gross domestic product at market prices:  $GDP_{pm} = T_{fa} + T_{dcp} + T_{rwp}^{(1)} + T_{dca} + T_{rwa}$

(1) part of the net taxes on products

- Gross national income:  $GNI = T_{dfr} + T_{dcp} + T_{dca}$

- Gross disposable income:  $GDI = (T_{dfr} + T_{dcp} + T_{dca} + T_{ddic}(\text{received}) + T_{dcrw}) - (T_{rwdic} + T_{ddic}(\text{paid}))$

In the NAM, this aggregate is represented by  $T_{II4II2\&3}$ , which does not have any other relationship with the SAM transactions.

- Gross saving:  $T_{ddik} = GDI - T_{pdc}$

- Net lending/borrowing of the economy (NLB):  $T_{dkdkf} = (T_{ddik} + T_{dkdik}(\text{received}) + T_{dkrw}) - (T_{pdc} + T_{dkdik}(\text{paid}) + T_{rwdik})$

If the accounts of institutions are disaggregated, the corresponding value for each one would be its total balance,  $T_{ddik}$  (gross saving) being the current one.

- Balance of Payments - Current Account – Total:  $CB = IB + GSB + CTB$

- Balance of Payments - Current Account – Income:  $IB = T_{frw} - T_{rwf}$

- Balance of Payments - Current Account – Goods & Services =

$$GSB = T_{prw} - (T_{rwp}^{(2)} + T_{rwdc}^{(3)})$$

(2) part of imports; (3) part of direct purchases abroad by households

- Balance of Payments - Current Account – current transfers:

$$CTB = T_{dcrw} - (T_{rwdc}^{(4)} + T_{rwa} + T_{rwp}^{(5)})$$

(4) part of current transfers; (5) part of the net taxes on products

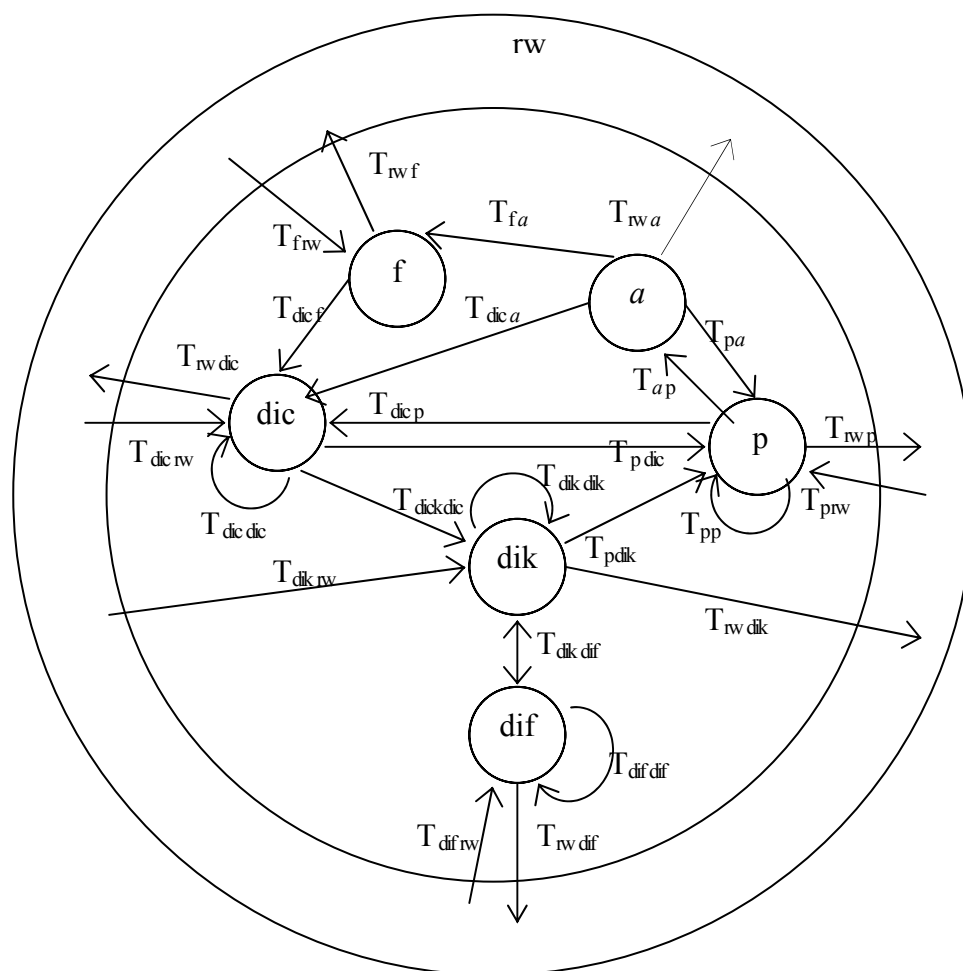
- Balance of Payments – Capital Account:  $KB = T_{dkrw} - T_{rwdk}$

- Balance of Payments - Financial Account (+ Errors and Omissions):  $FB = T_{dfrw} - T_{rwdf}$

Therefore, once all the national accounting transactions have been integrated into a matrix, it is then possible to integrate into the same matrix all the fundamental and complementary tables of national accounts, with it even being possible to include information from other sources (as, for example, in the case of disaggregations of the accounts that are not possible from the national accounts).

Schematically, the flows between the described accounts represent the circular flows in the economy that, using the SAM description, can be seen in Outline 1.

## Outline 1: The nominal flows between the SAM accounts



In Outline 1, the smaller circle represents the (domestic) economy and the bigger one the world. With the direction of the arrows representing the direction of the nominal flows, within the smaller circle we have all the transactions within the domestic economy, with the transactions between this and the rest of the world being represented by the arrows that cut over its boundaries.

This outline helps us to understand how important is the study of the direct and induced effects of any change in any flow in the whole economy - and the SAM-based modelling provides this.

The correspondence shown between the accounts and transactions of the SAM and the NAM makes it clear that the SNA can be considered as the basic source of information for the construction of the SAM. On the other hand, once the SNA transactions have been identified within each SAM/NAM transaction, which can be considered as a grand total (SNA 93, Prg. 20.13), every process of disaggregation (not only from the SNA, but also from other occasional sources) will be made easier without losing the consistency of the whole system. In this case, the transactions or cells of the matrices that have been referred to would be transformed into submatrices, in which the sum of all their cells is equal to the first figure. Therefore, within this framework, a matrix could refer to the

European Union as a whole, it then possible being to work with SAMs that, in turn, could be disaggregated at a regional level<sup>5</sup>, with all the usefulness that this could have for policy-making.

A possible starting point for this is given by Table 4, which uses an example for Portugal in 2002<sup>6</sup> and works at a highly aggregated level from the integrated economic accounts, except for the disaggregation undertaken for the rest of the world (from the rest of the world account).

Table 4. Aggregate Social Accounting Matrix for Portugal in 2002 (in millions of euros)

	f	a	p	dic	dik	dif	rw - EU	rw - other	total
f	0	118 445	0	0	0	0	3 288	2 068	123 802
a	0	0	250 071	0	0	0	0	0	250 071
p	0	132 321	0	110 664	34 159	0	29 876	8 003	315 023
dic	115 973	-565	17 695	66 939	0	0	3 330	1 463	204 835
dik	0	0	0	23 026	6 982	8 674	2 619	39	41 339
dif	0	0	0	0	0	50 439	16 893	7 258	74 590
rw - EU	5 843	-130	36 546	2 834	87	10 826			56 006
rw - other	1 986	0	10 711	1 372	110	4 651			18 831
Total	123 802	250 071	315 023	204 835	41 339	74 590	56 006	18 831	

Sources: Portuguese National Accounts

Note: Due to the lack of data regarding the financial transactions divided by the EU (European Union) and other countries, the division was made by using the structure of net borrowing, which is part of the financial transactions from the rest of the world.

### 3. The SAM as a database for economic modelling

From the previous section, it "can readily be seen that" the SAM "incorporates all major transactions within a socio-economic system" (Thorbecke, 2003). It consists of a data set of interrelated subsystems that, on the one hand, provides an analytical picture of the circular flow or the general equilibrium interactions of the market economy, studied in a particular accounting period, and, on the other hand, serves as an instrument for assessing the effects of changes in the particular nominal flows represented by the matrix (injections into and leakages from the system), which might be the result of policy measures.

<sup>5</sup> Although not yet in a SNA 93 framework, this issue was also dealt with by J. Round in his article "A SAM for Europe: Problems and Perspectives" (Economic Systems Research, 3, 249-268, 1991). In turn, and still within a SNA 93 framework, T. Jellema, S. Keuning, P. McAdam and R. Mink also deal with the issue in: "Developing a Euro Area Accounting Matrix: Issues and Applications" (European Central Bank, Working Paper Series, 356, 2004).

<sup>6</sup> Using the most recent, definitive and complete National Accounting data available when this paper was written.

As Pyatt (1991) concluded: "... a SAM is a framework both for models of how the economy works as well as for data which monitor its workings. Recognition of this duality is of basic importance for quantitative analysis. It implies, *inter alia*, that the accounting identities which are captured by a SAM are not to be regarded simply as consistency requirements which must be imposed on a model, but rather they should be seen as a logical consequence of the paradigms which economists have adopted for analyzing society".

On the other hand, the flexibility of the SAM makes it possible, by either top-down or bottom-up methods, to break down or aggregate each account into categories without losing the consistency of the whole system, which can be a crucial feature for economic modelling.

Especially at the macro and the meso level, economic models should have accounting frameworks which, with their inherent consistency and Computable General Equilibrium (CGE) models, in particular, "describe the whole circular flow of a market economy, while maintaining accounting consistency" and are therefore "appropriate for operating within a SAM framework" (Abbink et al., 1995).

The implementation of inappropriate policies may result, at least in part, from a deficient knowledge of their (direct and indirect) effects, which may in turn result from inappropriate economic modelling or the inadequacy of the databases that support this, so that the SAM as proposed here, and its modelling, may be a step forward.

#### **4. Concluding Remarks**

The flexibility and consistency inherent in the SAM and the possibility of its construction from the national accounts systems that adopt the SNA 93, notably the ESA 95, may be considered important contributions towards better policy analysis from better data.

The European Union, for instance, could use regional SAMs to construct a European SAM, it being possible to identify and work, in a more or less detailed way<sup>7</sup>, with all the transactions within and between EU member states in a flexible and consistent framework.

Since SAMs can be constructed from the national accounts, time series of national accounting transactions could be compiled and, using the available computing technology, these could then be exposed to the wide range of possibilities of econometric modelling, for the definition of the SAM cell contents. Most importantly, it is even possible to consider qualitative variables, to separate quantities and prices (using current and constant price series or series from the previous year) or to calculate elasticities. It would then be possible to speak, for instance, of dynamic econometric

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<sup>7</sup> For the highlighting of the development and forecasting of the System of Economic and Social Accounting Matrices and Extensions (SESAME), in which the basic principles of national accounts are extended to include a wider range of statistics, notably social and environmental ones, see, for instance, Keuning (1996).

Computable General Equilibrium (CGE) models that, whether isolated or in sets, would provide a better policy definition and analysis, from better data. In this case, it would also be possible to speak about the past, present and future and/or about *ex-ante* and *ex-post* analysis.

On the other hand, considering modelling techniques as a support for (socio)economic theory, better grounded empirical evidence could be a way in which to (re)evaluate that theory or even to (re)orient the way in which reality is being defined and conceptualized, considering the changes in (socio)economic circumstances and perspectives that we are currently experiencing all around the world.

The possibility of making either a top-down or a bottom-up approach without losing the consistency of the whole system also allows for research into the relationships between macro, meso and micro simulations, among others.

With the specification of the defined methodology, domestic statistical institutes do not need to construct and provide SAMs or NAMs. They only need to provide detailed information on national (T) accounts transactions and the corresponding “from whom to whom” matrices in those cases in which all the transactions are not covered by the fundamental and complementary tables of national accounts. And from these, the users would be able to select and work upon the data according to their needs. Obviously, the level and characteristics of such detail needs to be carefully defined.

## References

- Abbink, G., Braber, M. and Cohen, S. (1995). A SAM-CGE demonstration model for Indonesia: static and dynamic specifications and experiments. *International Economic Journal*, 9(3), 15-33.
- Eurostat (1996). *European System of Accounts (ESA 95)*. Eurostat, Luxembourg.
- IWSG - Inter-Secretariat Working Group (1993). *System of National Accounts (SNA 93)*. Commission of the European Communities – Eurostat, Brussels/Luxembourg; International Monetary Fund, Washington, DC; Organization for Economic Co-operation and Development, Paris; United Nations Statistical Office, New York; World Bank, Washington DC.
- Keuning, S.J. (1991). Proposal for a Social Accounting Matrix which fits into the next System of National Accounts. *Economic Systems Research*, 3, 233-248.
- Keuning, S.J. (1996). *Accounting for Economic Development and Social Change*. IOS Press, Amsterdam, 233 pp.
- Pyatt, G. (1988). A SAM Approach to Modeling. *Journal of Policy Modeling*, 10, 327-352
- Pyatt, G. (1991). Fundamentals of Social Accounting. *Economic Systems Research*, 3, 315-341.

- Pyatt, G. and Roe, A. (1977). *Social Accounting for Development Planning with Special Reference to Sri Lanka*. Cambridge University Press, Cambridge.
- Pyatt, G. and Round, J. (1985). Accounting and Fixed Price Multipliers in a Social Accounting Matrix Framework, in Pyatt, G. and Round, J. (coord.), *Social Accounting Matrices. A Basis for Planning*. A World Bank Symposium, World Bank, Washington, D.C.; also in *Economic Journal*, 89 (356), 1979, pp. 850-873.
- Round, J. (2003). Constructing SAMs for Development Policy Analysis: Lessons Learned and Challenges Ahead. *Economic Systems Research*, 15, 161-183.
- Santos, S. (2006). *Constructing a database for economic modelling from the System of National Accounts: a Social Accounting Matrix for Portugal*. Paper presented to EcoMod 2006 – International Conference on Policy Modeling. Also available at SSRN: <http://ssrn.com/abstract=916089> (Working Paper Series)
- Thorbecke, E. (2003). Towards a Stochastic Social Accounting Matrix for Modelling. *Economic Systems Research*, 15, 185-196.